Claims

1. An injection nozzle for an internal combustion engine, in particular in a motor vehicle,

-having a nozzle body (2) equipped with at least one injection opening (3),

-having a nozzle needle (5) that is guided in a needle guide (6) of the nozzle body (2) and is able to control the injection of fuel through the at least one injection opening (3),

-characterized in that

-a control piston (18) is provided, which is drive-coupled to an actuator (19) and has a first control surface (21),

-the nozzle needle (5) has a first compensator surface (16) or is drive-coupled to a compensator piston (32) that has a first compensator surface (16),

-the first compensator surface (16) is hydraulically coupled to the first control surface (21) via a first hydraulic path (22), and

-a second hydraulic path (29) is able to hydraulically couple the first control surface (21) to a supply line (9) that supplies highly pressurized fuel to the at least one injection opening (3).

2. The injection nozzle according to claim 1, characterized in that the nozzle needle (5) has a pressure shoulder (12) that is hydraulically connected to the supply line (9) on a continuous basis.

3. The injection nozzle according to claim 1 or 2, characterized in that in order to open the nozzle needle (5), the control piston (18) is actuated so as to produce a drop in the pressure acting on the first compensator surface (16).

4. The injection nozzle according to one of claims 1 through 3, characterized in that the first hydraulic path (22) leads through a first control chamber (23) that contains the first control surface (21), a first compensator chamber (24) that contains the first compensator surface (16), and a connecting line (25) that connects the first control chamber (23) to the first compensator chamber (24).

5. The injection nozzle according to claim 4, characterized in that

-the control piston (18) has a second control surface (27) situated in a second control chamber (28) that communicates with the supply line (9);

-the second hydraulic path (29) leads through the first control chamber (23) and a throttled control piston bypass (30), which is situated between the control piston (18) and a control piston guide (20) and hydraulically connects the first control chamber (23) to the second control chamber (28).

6. The injection nozzle according to one of claims 1 through 4,

characterized in that

-the compensator piston (32) has a second compensator surface (34) situated in a second compensator chamber (35) that communicates with the supply line (9),

-the two compensator surfaces (16, 34) act in opposite directions when subjected to pressure.

7. The injection nozzle according to one of claims 1 through 6,

characterized in that

-the control piston (18) is drive-coupled to the actuator (19) by means of a push rod (40),

-the actuator (19) is embodied in the form of a hollow actuator through the center of which the push rod (40) is guided,

-at an end of the actuator (19) oriented away from the control piston (18), the push rod (40) supports a drive piston (39) that the actuator (19) is able to drive,

-the actuator (19) is embodied and positioned so that when it is triggered, it drives the drive piston (39) in an opening direction (15) of the nozzle needle (5).

8. The injection nozzle according to one of claims 1, 2, and 7,

characterized in that

-the first control surface (21) and the first compensator surface (16) are contained in a shared conversion chamber (43),

-the control piston (18) and the compensator piston (32) are guided coaxially one inside the other.

9. The injection nozzle according to claims 6 and 8, characterized in that

the second compensator chamber (35) is embodied in the control piston (18) and communicates with the supply line (9) through the control piston (18).

10. The injection nozzle according to claim 8 or 9, characterized in that

the second hydraulic path (29) leads through a control piston bypass (30), which is situated between the control piston (18) and a control piston guide (20), and/or through a compensator piston bypass (47), which is situated between the compensator piston (32) and a compensator piston guide (33).